"THE EFFECT OF ENDURANCE TRAINING ON EXTENSORS WITH CORE STABILITY EXERCISE & CORE STABILITY EXERCISE IN MECHANICAL LOW BACK PAIN"

A Dissertation Submitted to

The Tamilnadu Dr.M.G.R.Medical University,

CHENNAI

In partial fulfillment of the requirements

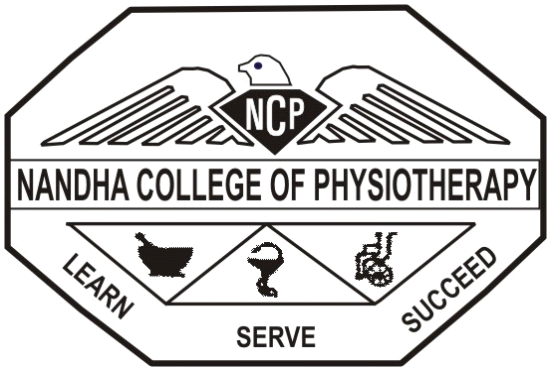
For the award of the

MASTER OF PHYSIOTHERAPY DEGREE

(Advanced Physiotherapy in Orthopaedics)

Submitted by

Reg.No.271410061



NANDHA COLLEGE OF PHYSIOTHERAPY

ERODE -638 052

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Under the guidance of

Prof.V.MANIVANNAN.,M.P.T

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Dissertation Evaluated on ……..

Internal Examiner External Examiner

CERTIFICATE BY THE HEAD OF THE INSTITUTION

PROF.V.MANIVANNAN, M.P.T. (ORTHO)
Principal/Head of the Institution,
NANDHA COLLEGE OF PHYSIOTHERAPY,
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This is Certify that **(Reg. No. 271410061)** is a Bonafide student of **Nandha College of Physiotherapy, studying Master of Physiotherapy (Advanced Physiotheraphy in Orthopaedics)** degree course from the year 2014-2016. The dissertation entitled, **"THE EFFECT OF ENDURANCE TRAINING ON EXTENSORS WITH CORE STABILITY EXERCISE & CORE STABILITY EXERCISE IN MECHANICAL LOW BACK PAIN"** is a record of original and independent work done by him under the guidance of me.

I wish him a great success in his dissertation work.

Place : Signature of Principal

Date :

CERTIFICATE BY THE GUIDE

This is to certify that this dissertation entitled, **"THE EFFECT OF ENDURANCE TRAINING ON EXTENSORS WITH CORE STABILITY EXERCISE & CORE STABILITY EXERCISE IN MECHANICAL LOW BACK PAIN"** submitted by (Reg.No. 271410061) is a record of original and independent work done by the candidate during the period of study under my supervision and guidance. The dissertation represents entirely and independent work on the part of the candidate but for the general guidance by me.

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DECLARATION

I here, by declare and present my project work entitled **"THE EFFECT OF ENDURANCE TRAINING ON EXTENSORS WITH CORE STABILITY EXERCISE & CORE STABILITY EXERCISE IN MECHANICAL LOW BACK PAIN"** is outcome of original research work was under taken and carried out by me under the guidance of **Prof. V.MANIVANNAN.,M.P.T.,**

To the best of my knowledge this dissertation has not been formed in any other basic for the award of any other degree, diploma, associateship, fellowship, previously form, any other medical university.

Register No:

271410061

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Looking at the list of people who have contributed in making this gargantuan task a reality, I feel Humble.

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1. INTRODUCTION

Mechanical low back pain is essentially a universal and self limiting phenomenon. It continues to be one of the enigmas of modern medicine. It is not only a medical problem ,but a social, legal and practical one as well. Men and women are equally affected. It occurs most often between ages 30 and 50. The natural history of Mechanical low back pain depend upon the influence of age, injury and adaptive changes to the different neuro musculo skeletal changes.

Mechanical low back pain otherwise named as "Activity related spinal pain" . It is a common musculo skeletal disorder causing back pain mostly in lower thoracic and lumbar region, it can be either acute or chronic in its clinical presentation.

Muscle is a potential source of low back pain. Some authors stated that failure of muscles to protect passive structures from excessive loading may result in damage to the pain sensitive structures in back and produce pain. Lack of endurance of trunk muscles has been identified as a predictor of first-time occurrence of low back trouble .

Physical therapy includes patient education and a variety of stretching and strengthening exercises, Manual therapies and Modalities. While the abdominal muscles receive much of the attention for their protective function in the low back, it is the extensors are more important. Decreased trunk extensor endurance has been shown to correlate with low back trouble. Trunk extension exercise training is therefore an important preventive approach for individuals present with low back pain. Certain muscles in particular have been shown to stabilize the low back in various situations.

Spinal loading forces were increased during a fatiguing isometric trunk extension effort of torque. Torque output remained constant because as the erector spinal fatigued, substitution by secondary extensors such as the internal oblique and latissmus dorsi muscles occurred. Abnormal motor control has been correlated with low back problems. Poor control of the axis of rotation of trunk during sagital plane movements, asymmetric muscle activation during spinal extension or gait, reduced activity of the transverse abdominus, poor endurance of the spinal extensors and atrophy of the multifidus have all been correlated with low back problems.

Endurance is mechanically defined as either the point of isometric fatigue, where the contraction can no longer be maintained at a certain level or as the point of dynamic fatigue, when repetitive work can no longer be sustained at a certain force level.

1.1 OPERATIONAL DEFINITION:

Mechanical back pain is the general term that refers to any type of back pain caused by placing abnormal stress and strain on muscles of the vertebral column. Typically, mechanical back pain results from bad habits, such as poor posture, poorly designed seating, incorrect bending, lifting motion.

Endurance is the ability to work for prolong period of time and ability to resist fatigue.

1.2 STATEMENT OF THE PROBLEM

This study intends to analyze "the effect of endurance training on extensors with core stability exercise & core stability exercise in mechanical low back pain "

1.3 Need for the study:

In most cases, it begins and disappears within six weeks, but approximately 20% of individuals with lumbar pain do not show any improvement in their condition, which may progress to chronic low back pain.

Through this study I would like to compare the effect of endurance training on extensors with core stability exercise and core stability exercise and find out which method is effective in reducing pain and disability in Mechanical low back pain patients.

1.4 AIM AND OBJECTIVES OF THE STUDY

1.4.1 Aim of the Study

The purpose of this study is to ascertain the effect of endurance training of extensors with core stabilization exercise versus core stabilization exercise in the management of mechanical low back pain

1.4.2 Objectives of the study:

1. To assess the effect of endurance training of extensors with core stability exercise versus core stability exercise in the management of mechanical low back pain, in terms of pain perception
2. To assess the effect of endurance training of extensors with core stability exercise versus core stability exercise in the management of mechanical low back pain, in terms of functional disability.

1.5 HYPOTHESIS:

- **Null hypothesis**

  There will be no significant effect of endurance training on extensors with core stability exercise and core stability exercise in mechanical low back pain.

- **Alternative hypothesis**

  There will be significant effect of endurance training on extensors with core stability exercise and core stability exercise in mechanical low back pain

2. REVIEW OF LITERATURE

Review on treatment for low back pain

1. **Theodore R. fields** A primary care approach to the diagnosis and management of low back pain summarized with 97% of patients with back pain will have a mechanical cause and most will get better quickly but the other potential causes need to considered early on. Treatment modalities for acute low back pain are often different from those with chronic pain. Careful early attention to differential diagnostic possibilities and careful patient selection for individual treatment modalities will maximize therapeutic success.
2. **James rainville, Carol Hartigan et.al** have done research on exercise as a treatment for chronic low back pain which concluded that exercise is safe for individuals with back pain because it does not increase the risk of future back injuries or work absence. Substantial evidence exists supporting the use of exercise as a therapeutic tool to improve impairments in back flexibility and strength.

Review on effect of endurance exercise to spinal extensors

3. **Marras WS Rangarajulu SL** the endurance of trunk muscles may be related to low back pain. Fatigue can affect the ability of people with low back pain to respond to demands of an unexpected load.
4. **Plum P, Rehfield et.al** Fatigue after repetitive loading also lead to loss of control and precision which may predispose an individual to develop low back pain. Therefore trunk muscle endurance training has been recommended to elevate fatigue threshold and improve performance, thus reducing disability.
5. **Manniche C, Hesselsoe G, Bentzen L et.al** the results of controlled clinical trial suggest that endurance exercise is effective for people with chronic low back pain. The results of the trial suggest that intensive extension exercise are superior to using an exercise program with isometric back extension and abdominal exercise.

Review on effect of core stability exercise to spinal extensors

6. **Akuthola and Nadler, 2004,** The core has been described as a box with the abdominals in the front, paraspinals and gluteals in the back, the diaphragm as the roof and the pelvic floor and hip girdle musculature as the bottom. Therefore, the core serves asa muscular corset that works as a unit to stabilize the body and spine

7. **Marshall and Murphy (2005)**, core stability is a generic description for the training of the abdominal and lumbopelvic region. To define core stability, the combination of a global and local stability system has been used. The global system refers to the larger superficial muscles around the abdominal and lumbar region; such as the rectus abdominus, paraspinal and external obliques. These muscles are the prime movers for trunk or hip flexion, extension or rotation.
8. **O'Sullivan (2005),** coordinated patterns of muscle recruitment are essential between the global and local muscle system of the trunk, in order to compensate for the changing demands of daily life, to ensure that the dynamic stability of the spine is preserved.

Review on outcome measures

9. **Chidozie E. Mbada M.Sc (PT), Olusola Ayanniyi PhD** studied effects of static and dynamic endurance exercises in 84 patients. Three types of protocols were given to them, one is mc.kenzie protocol, second group is given mc.kenzie protocol plus static endurance exercises and third group is given mc.kenzie protocol plus dynamic endurance exercise. The outcome measures are quadriple visual analog scale,Rolland-morris back pain questionnaire and oswestry low back disability questionnaire. Mc.kenzie protocol plus dynamic back exercises resulted more improvement than other two protocols.
10. **Leighann Litcher-kelly, et al (2007)** in their study, a systematic review on measures used to assess chronic musculoskeletal pain in clinical and randomized controlled clinical trials by using many types of pain assessments available to researchers conducting clinical trials, ranging from simple, single-item Visual Analog Scale (VAS) questions through extensive, multidimensional inventories. In their study they showed that Visual Analogue Scale(VAS) were responsive than the other complex multidimensional measures as Visual Analogue Scale is a single item measure, it is easy to access pain where pain is the primary outcome.

3. MATERIALS AND METHODOLOGY

3.1 MATERIALS

- A firm bed
- Pillow
- Patient assessment chart
- Data analysis chart
- Patient consent form

3.2 METHODOLOGY

3.2.1 Study design

The research design of this study is experimental in nature, done on different subjects with pre-test and post -test settings.

3.2.2 Sample size

The study will be carried on 30 subjects, divided into 15 in each group .

3.2.3 Sampling method

Simple random sampling method

Variables

Independent variable:

- Endurance training to spinal extensors
- Core stability exercises

Dependent variable:

- Pain
- Functional disability

3.3 STUDY SETTINGS

- Out Patient Department, Nandha College Of Physiotherapy – Erode.
- Government Headquarters Hospital – Erode.
- LKM Hospital – Erode

3.4 STUDY DURATION : Eight months.

3.4 .1 TREATMENT DURATION : 3 weeks

3.5 SELECTION CRITERIA

3.5.1 Inclusion criteria

- Subjects with age group of 25 to 45 years.
- Subjects with chronic mechanical low back pain.
- Both male and female subjects.
- Duration of symptoms should be between 3 months and above.

3.5.2 Exclusion Criteria

- Subjects who have structural deformities.
- Patients with inflammatory disease of spine (Ankylosing spondylitis, R.A).
- Patients with Tumours of spine.
- Subjects with infections of spine.
- Subjects who has undergone spinal surgery.
- Pregnant Women.

3.6 PARAMETERS

- Low back pain will be measured using Visual Analog Scale.
- Functional Disability will be measured using Modified Oswestry Low back pain Disability Questionnaire.

METHODOLOGY

Thirty samples selected from the population divided into two equal groups. The procedure was explained to subject. Both the group underwent a pre test measurement of pain intensity and functional disability.

- Group A treated with endurance training of extensors with core stability exercise
- Group B treated with core stability exercise.

Hence both groups are treated and after 3 weeks measured pain by visual analogue scale and Functional Disability will be measured using Modified Oswestry Low back pain Disability Questionnaire.

Technique

1. Endurance training for spinal extensors

The study group was given dynamic back exercises in five different positions. The participant was asked to move the trunk and the suspended limbs 10 times in each position. The treatment is given for 5 days in a week for 3 weeks.

Step-1: Bilateral shoulder lifts

Patient position: prone lying

Procedure: patient is asked to lay down in prone position with arms by the sides of the body, and head and trunk lifted off the plinth from neutral to extension

Step-2: Head and trunk lifts

Patient position: prone lying

Procedure: patient is asked to lay down in prone position with hands interlocked at occiput so shoulders are abducted to 90° and elbows flexed, and head and trunk lifted off the plinth from neutral to extension.

Step-3: Both arms elevated forward

Patient position: prone lying

Procedure: patient is asked to lay down in prone position with both arms elevated forwards, and head and trunk lifted off the plinth from neutral to extension

Step-4: Contra-lateral arm and leg lifts

Patient position: prone lying

Procedure: patient is asked to lay down in prone position and head, trunk and contra lateral arm and leg lifted off the plinth from neutral to extension

Step-5: Both arms and legs lifts

Patient position: prone lying

Procedure: patient is asked to lay down in prone position with both arms elevated forwards and both legs (with knees extended) lifted off the plinth from neutral to extension

2. Core Stability

"Core stability" describes the ability to control the position and movement of the central portion of the body. Core stability training targets the muscles deep within the abdomen which connect to the spine, pelvis and shoulders, which assist in the maintenance of good posture and provide the foundation for all arm and leg movements.

3.7 PROCEDURE FOR CORE STABILITY EXERCISES

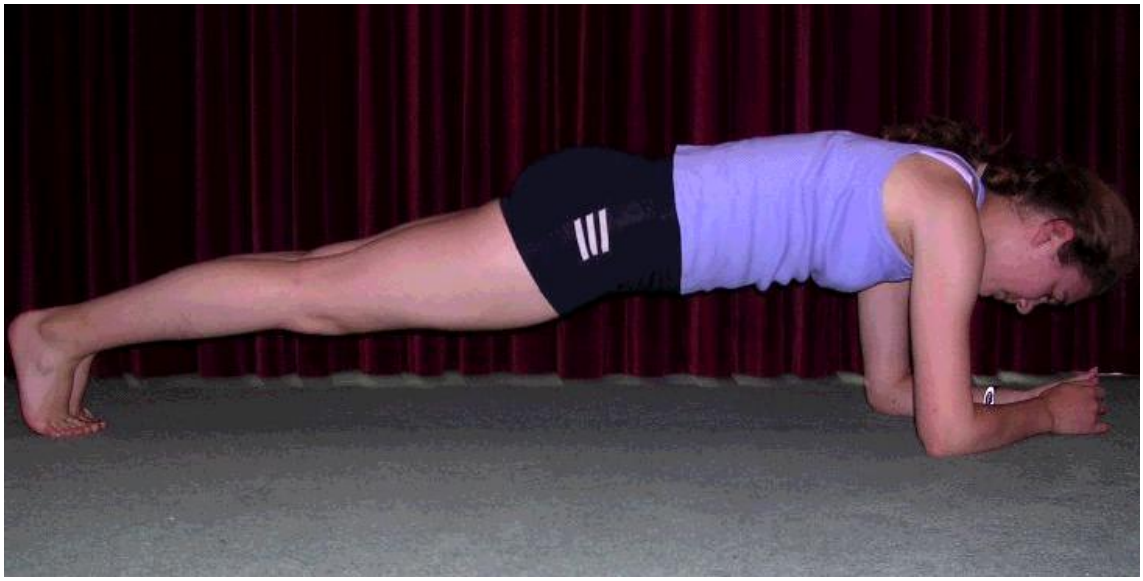
1. Crunches

a) Lie on your back with your knees bent and your feet flat on the floor.
b) "Crunch" or curl your stomach to lift your shoulders just off the floor.
c) Try not to use your hip flexor muscles to carry out this movement, or use your arms to pull up your head.

2. Oblique Crunches

a) Lie on your back. Raise your legs and bend them so that you form a right angle at your hips and your knees. Place your hands gently on the side of your head.
b) Lift your shoulders off the floor and twist, reaching your right elbow towards your left leg.
c) Return to the floor then repeat, twisting in the opposite direction.
d) Take care not to rock. Your hips and legs should stay as still as possible, allowing your trunk to do all of the work.

3. The Plank



a) Assume a front-support position resting on your fore-arms with your shoulders directly over your elbows.
b) Straighten your legs out behind you and lift up your hips to form a dead-straight line from your shoulders to your ankles. You should be balanced on your fore-arms and toes, with your lower abdomen and back working to keep your body straight. Hold for 1 minute.
c) Aim to complete 3 x 30 crunches, with 30 seconds of recovery between sets. Aim to complete 3 x 30 crunches (15 on each side per set) with 30 seconds of recovery between sets. Aim to be able to hold this position for 3 x 1 minute.

4. Static Leg and Back

a) Lie on your back with your knees bent and your feet flat on the floor.
b) Lift your pelvis so that you form a bridge position with a straight line running from your shoulders to your knees.
c) Lift your right leg off the floor and extend it so that it continues the straight line. You should be able to feel your left buttock, your back, and lower abdomen working to keep the position.
d) Hold for 30 seconds then repeat on the other leg.

5. Hamstring Raises

a) Balance on the floor on your hands and knees. Your back should be flat and your hips parallel to the floor.
b) Raise one leg behind you until you cannot lift it any higher without rotating your hips or arching your back. The movement should be slow and controlled.
c) Return the leg to the floor and repeat.

6. Static Straight Legs

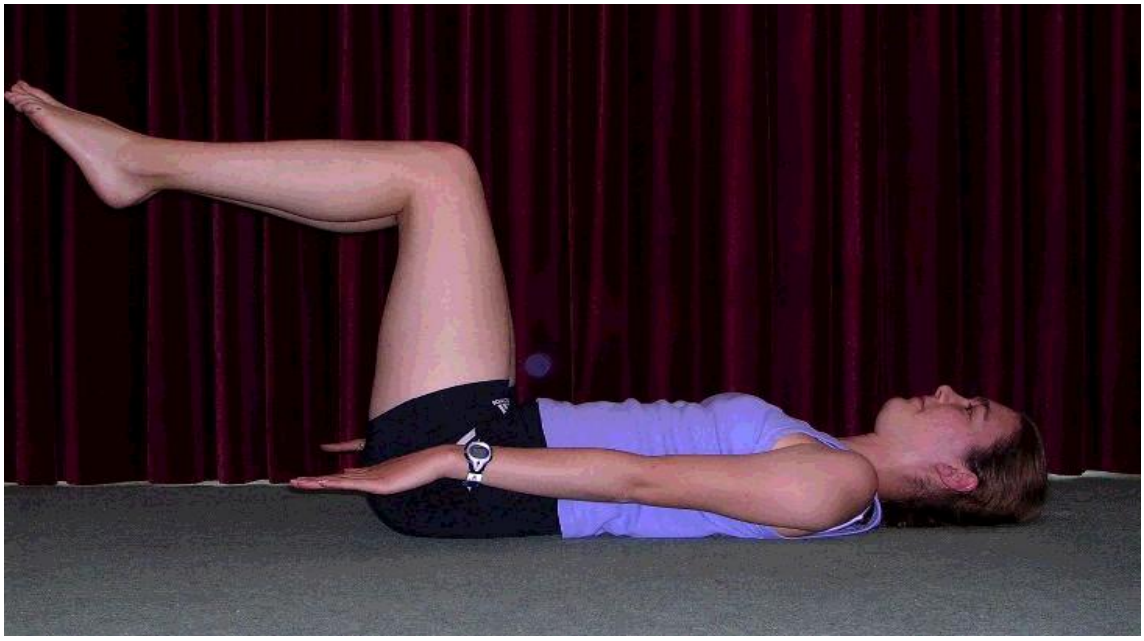
a) Lie on your back with your legs together and your arms by your sides.
b) Keeping your legs straight, lift your heels approximately 4 inches off the floor.
c) Hold for 1 minute

7. Lowering and Raising Legs

a) Lie with your back flat on the floor and your legs raised above your hips.
b) Lower your legs for 30 seconds until the heels are about 4 inches from the floor. Without allowing your heels to touch down, raise them for another 30 seconds. Complete 15 repetitions one leg, and the repeat on the other leg. Concentrate on keeping completely still with your hips square and your back flat. (superman) Do not allow your back to arch. The small of your back should be flat on the floor.

c) Keep your legs straight and do not allow your back to arch. Try not to move too quickly.

8. Hundreds



a) Lie on your back with your arms by your sides. Raise your legs and bend them so that you form a right angle at your hips and knees.

b) Keeping your arms straight and lifting your hands no more than a few inches, gently tap the floor 100 times.

Things to remember when doing core stability exercises:

1. Do not let your whole stomach tense up. If your upper abdominal muscles "bulge" outwards it means you have cheated by using the large rectus abdominus (six pack) instead of the transverses abdominus (lower abdominals).
2. Do not brace your lower abdominals too hard; a gentle contraction will suffice. You are trying to improve endurance rather than maximum strength. Only clench them about 50%.
3. Do not hold your breath as this is a signal that you are not relaxed. You must learn to breathe normally since you will need to breathe when you are running!
4. It is a good idea to do core stability as part of your cool down after running, or on a cross-training day.

4. DATA PRESENTATION AND STASTISTICAL ANALYSIS

STATISTICAL TOOLS

The statistical tools used in the study are paired t-test and unpaired t-test.

PAIRED 't'-TEST

The paired t-test was used to find out the statistical significance between Pre and Post t-test values of VAS and ODI before and after treatment for Group A and Group B.

Formula for paired t-test,

$$S = \frac{\Sigma d^2 - \frac{(\Sigma d)^2}{n}}{n-1}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

d = difference between the pre test V_s post test

$\bar{d}$ = Mean difference

n = Total number of subjects

S = Standard deviation

UN -PAIRED 't'- TEST

The unpaired t-test was used to compare the statistically significance difference of DHI and VAS before and after treatment for Group A and Group B.

Formula for unpaired t –test,

$$S = \sqrt{\frac{(n_1-1){s_1}^2+(n_2-1){s_2}^2}{n_1+n_2-2}}$$

$$t = \frac{|\bar{x}_1-\bar{x}_2|}{s\sqrt{\frac{1}{n_1}+\frac{1}{n2}}}$$

n_1 = Total number of subject in group A.

n_2 = Total number of subject in group B.

x_1 = Difference between pre -test and post- test of Group A.

$\overline{x_1}$ = Mean difference between pre- test and post -test of group A.

X_2 = Difference between pre test and post test of Group B.

$\overline{X}_2$ = Mean difference between pre -test and post -test of Group B.

S = Standard Deviation.

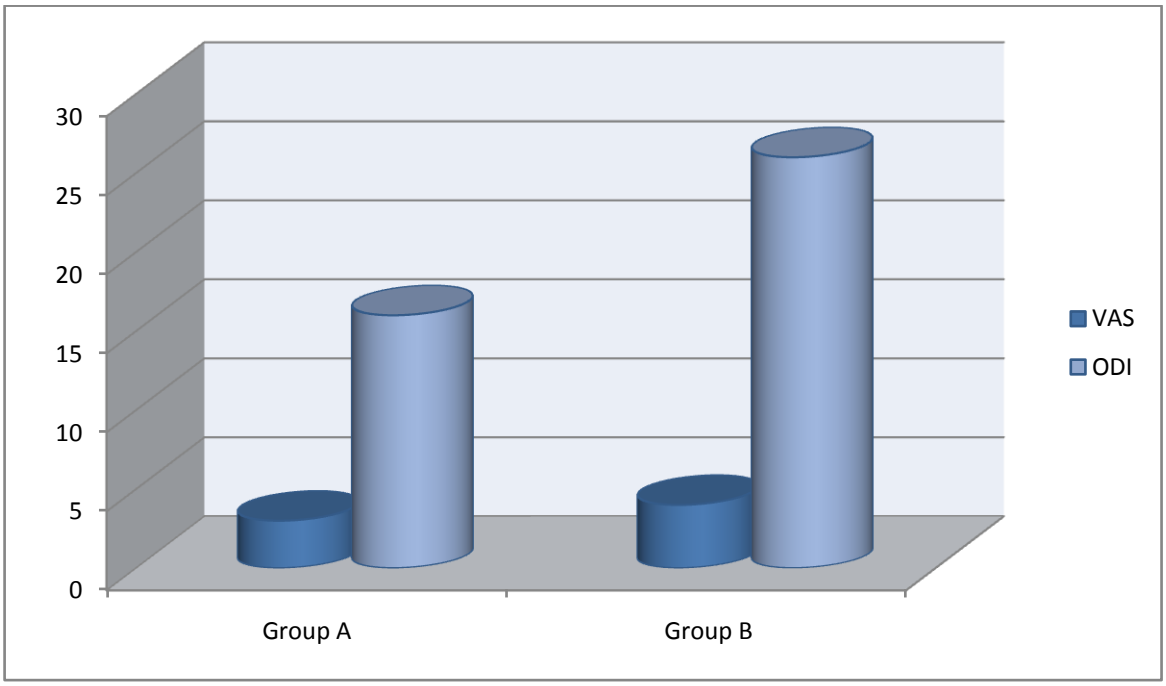
MAIN RESULTS

COMPARISON OF VARIABLES MEAN DIFFERENCE BETWEEN GROUP A & B

TABLE-4.4

Groups	VAS	ODI
Group A	3	16
Group B	4	26

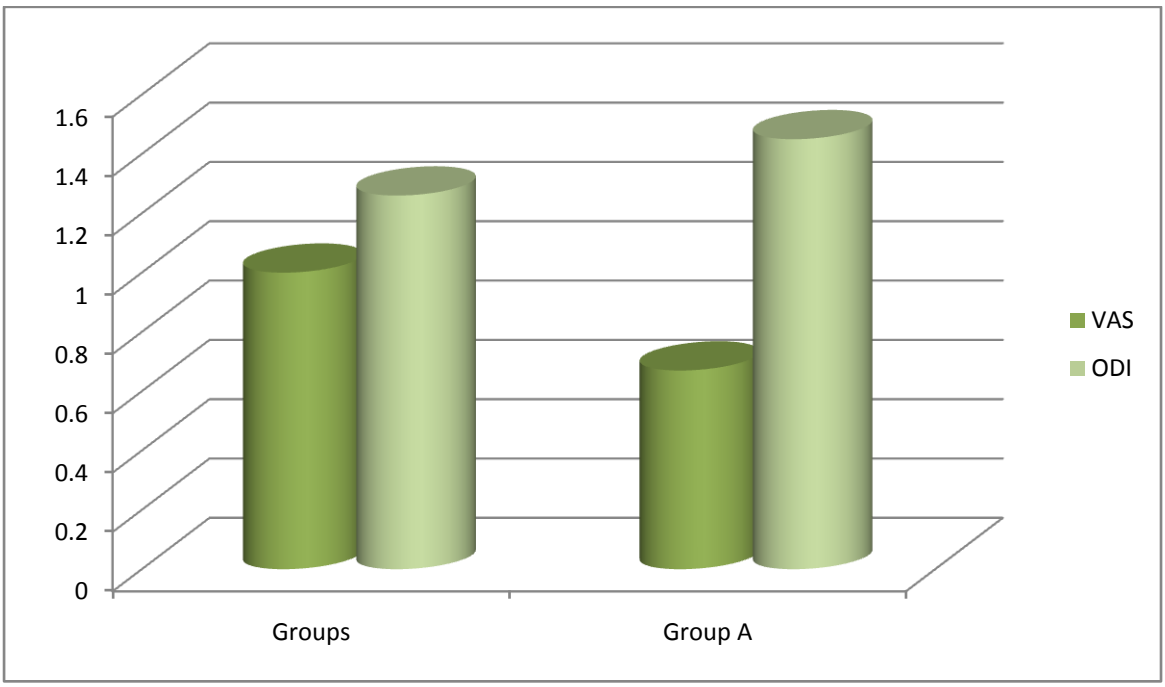
FIGURE-4.4 (MEAN DIFFERENCE BETWEEN GROUP A & B)



COMPARISON OF VARIABLES STANDARD DEVIATION BETWEEN GROUP A & B

Groups	VAS	ODI
Group A	1	1.26
Group B	0.67	1.45

FIGURE-4.5 (STANDARD DEVIATION OF BETWEEN GROUP A & B)

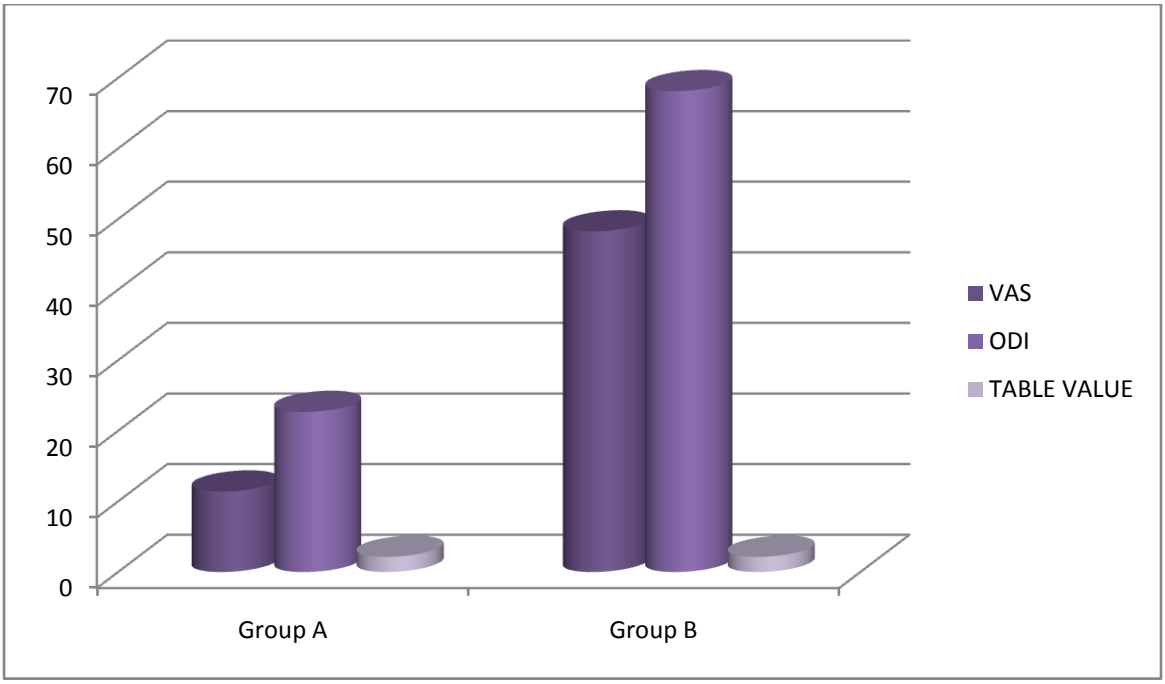


COMPARISION OF THE PAIRED‘t’ TEST AND TABLE VALUE BETWEEN GROUP A & B

TABLE-4.6

GROUPS	CALCULATED ' t' VALUE		TABLE VALUE	SIGNIFICANCE
	GROUP A	GROUP B		
VAS	11.4	22.68	2.15	SIGNIFICANT
ODI	48.25	68.13	2.15	SIGNIFICANT

FIGURE-4.6 (PAIRED ‘t’ TEST AND TABLE VALUE BETWEEN GROUP A AND GROUP B

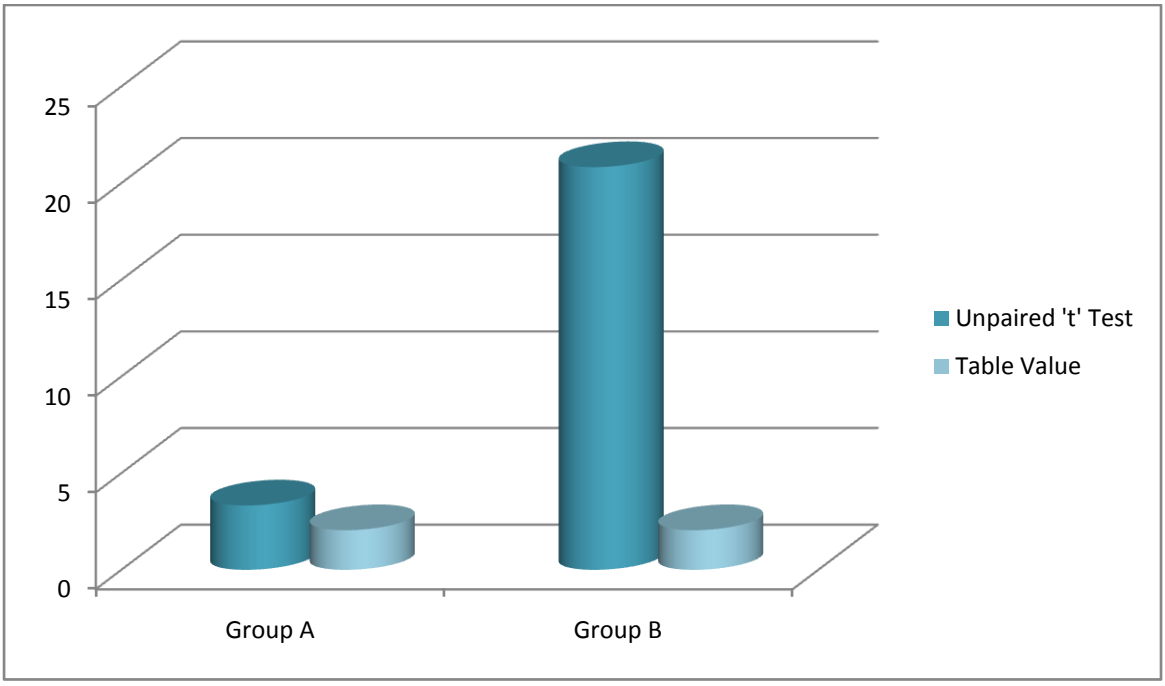


COMPARISION OF UN PAIRED 't' TEST AND TABLE VALUE BETWEEN VAS AND ODI

TABLE-4.7

VARIABLES	UNPAIRED 't' TEST	TABLE VALUE	SIGNIFICANCE
VAS	3.33	2.05	SIGNIFICANT
ODI	20.83	2.05	SIGNIFICANT

FIGURE- 4.7 (UN PAIRED 't' TEST AND TABLE VALUE BETWEEN VAS AND ODI)



5. RESULTS AND DISCUSSION

5.1 RESULTS

The study sample comprised of 30 patients. The median time interval between VAS and ODI questionnaire applied before and after therapy was 3 weeks. Among 30 patients, 15 were treated by endurance training of extensors with core stabilization exercise and 15 were treated with core stabilization exercises.

The pre and post test values were assessed by VAS and ODI in Group A. The mean difference value is 3 and 4 respectively. The standard deviation value is 1 and 0.67 respectively. The paired 't' test value for VAS and ODI is 11.4 and 22.68 .The paired 't' test value is more than table value 2.15 for 5% level of significance at 14 degrees of freedom.

The pre and post test values were assessed by VAS and ODI in group B. The mean difference value is 16 and 26 respectively. The standard deviation value is 1.26 and 1.45 respectively. The paired ' t ' test value for VAS and ODI is 48.25 and 68.13 . The paired ' t ' test value is more than table value 2.15 for 5% level of significance at 14 degrees of freedom.

The calculated 't 'values by unpaired ' t ' test were 3.33 and 20.83 . The calculated ' t ' values were more than the table value 2.05 for 5% level of significance at 28 degrees of freedom.

The paired ' t ' test values have shows that endurance training of extensors with core stabilization exercise was more effective than core stabilization exercise for patients with Mechanical low back pain . The unpaired 't' test values have shown that there was significant difference between two groups in showing improvement in their pain and functional ability for patients with Mechanical low back pain.

5.2 DISCUSSION

While consideration of improving pain and functional ability in patients with Mechanical low back pain, I found there was an effective and good improvement.

There was a statistically significant difference in the impact of pain and functional disability of patients with Mechanical low back pain before and after endurance training of extensors with core stabilization exercise. This demonstrates a positive effect of these Exercises on the functional training among patients. The effectiveness of endurance training of extensors with core stabilization exercise for the treatment of Mechanical low back pain was good.

This study has proved that endurance training of extensors with core stabilization exercise is more effective than the core stabilization exercise in Mechanical low back pain**.**

5.3 LIMITATIONS

- The study has been conducted on small sized sample only.
- This study took shorter duration to complete.
- The study limitations include backpain due to occupations alone.
- This study is not extended more than 3 weeks for a patient due to time constraint.

5.4 RECOMMENDATIONS

- A similar study may be extended with larger sample.
- The future study can be compared with other strengthening Exercises also.
- The endurance training of extensors with corestabilization exercise may be applied to back pain due to any other pathology.

6. SUMMARY AND CONCLUSION

In our samples, endurance training of extensors with corestabilization exercise resulted in a positive impact on their functional activities. The VAS and ODI differences in Mechanical low back pain patients before and after treatment were statistically significant.

Through the results, alternate hypothesis is accepted and also the study could be concluded that there is a significant difference between endurance training of extensors with corestabilization exercise and corestabilization in improving the propioception in patients with Mechanical low back pain**.**

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APPENDIX I

ASSESMENT FORMAT

Subjective assessment

- Name
- Age
- Sex
- Occupation
- Chief complaints
- History of illness

  a) Present history

  b) Past medical history

  c) Personal history

- Associated medical problems
- Pain assessment

  a) Duration

  b) Onset

  c) Frequency

  d) Nature of pain

  e) Aggravating factors

  f) Relieving factors

  g) Intensity

- Vital signs
- Temperature
- Blood pressure
- Pulse rate
- Respiratory rate

Objective assessment

On observation

- Built of patient
- Posture
- Structural abnormality

On palpation

- Tenderness
- Spasm

On examination

- ROM

Differential diagnosis

Management

- Aims
- Means
- Follow up

APPENDIX II

PATIENT CONSENT FORM

I_____ voluntarily consent to participate in the research named

The researcher has explained me the treatment approach in brief, risk of participation and has answered the questions related to the study to my satisfaction.

Signature of Participant :

Signature of the Witness :

Signature of Researcher :

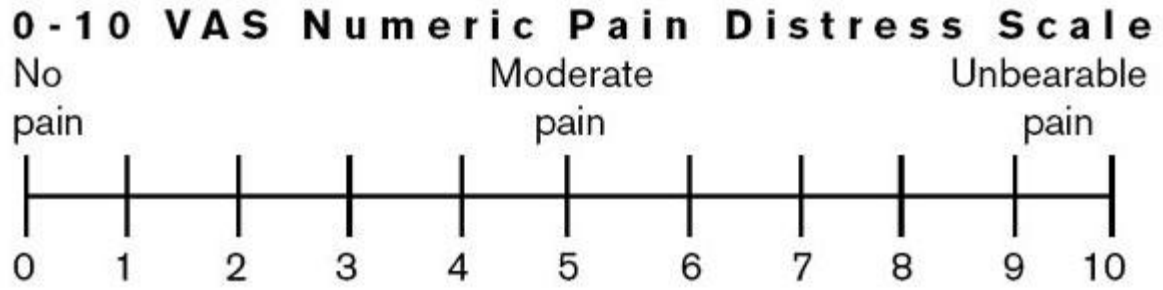
Date :

Place :

APPENDIX III

VISUAL ANALOG SCALE

The **visual analogue scale** or **visual analog scale** (**VAS**) is a psychometric response scale which can be used in questionnaires. It is a measurement instrument for subjective characteristics or attitudes that cannot be directly measured. When responding to a VAS item, respondents specify their level of agreement to a statement by indicating a position along a continuous line between two end-points.



Oswestry Low Back Pain Disability Questionnaire

Please complete this questionnaire. It is designed to tell us how your back pain affects your ability to function in everyday life.

I have "Chronic Pain" or pain that has bothered me for 3 months or more:

□ Yes □ No

Check one of the following:

□ Prior to Surgery □ After Surgery 3 Months □ After Surgery 1 year

□ After Surgery 6 weeks □ After Surgery 6 Months □ After Surgery 2 years

Please answer each section below by checking the One Choice that applies the most to you at this time. (You may feel that more than one of the statement relates to you at this time, but it is very important that you Please check only one choice that best describes your problem at this time.

Section 1: Pain Intensity

□ I can tolerate the pain I have without having to use pain killers. [0 points]

□ The pain is bad but I manage without taking pain killers. [1 point]

□ Pain killers give complete relief from pain . [2 points]

□ Pain killers give moderate relief from pain. [3 points]

□ Pain killers give very little relief from pain. [4 points]

□ Pain killers have no effect on the pain and I do not use them. [5 points]

Section 2: Personal Care

□ I can look after myself normally without causing extra pain. [0 points]

□ I can look after myself normally but it causes extra pain. [1 point]

□ It is painful to look after myself and I am slow and careful. [2 points]

□ I need some help but manage most of my personal care. [3 points]

□ I need help every day in most aspects of self care. [4 points]

□ I do not get dressed wash with difficulty and stay in bed. [5 points]

Section 3: Lifting

□ I can lift heavy weights without extra pain. [0 points]

□ I can lift heavy weights but it gives extra pain. [1 point]

Section 3: Lifting (Cont.)

□ Pain prevents me from lifting heavy weights off the floor but I can manage if they are conveniently positioned for example on a table. [2 points]

□ Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned. [3 points]

□ I can lift only very light weights. [4 points]

□ I cannot lift or carry anything at all. [5 points]

Section 4: Walking

□ Pain does not prevent me walking any distance. [0 points]

□ Pain prevents me walking more than 1 mile. [1 point]

□ Pain prevents me walking more than 0.5 miles. [2 points]

□ Pain prevents me walking more than 0.25 miles. [3 points]

□ I can only walk using a stick or crutches. [4 points]

□ I am in bed most of the time and have to crawl to the toilet. [5 points]

Section 5: Sitting

□ I can sit in any chair as long as I like. [0 points]

□ I can only sit in my favorite chair as long as I like. [1 point]

□ Pain prevents me sitting more than 1 hour. [2 points]

□ Pain prevents me from sitting more than 0.5 hours. [3 points]

□ Pain prevents me from sitting more than 10 minutes. [4 points]

□ Pain prevents me from sitting at all. [5 points]

Section 6: Standing

□ I can stand as long as I want without extra pain. [0 points]

□ I can stand as long as I want but it gives me extra pain. [1 point]

□ Pain prevents me from standing for more than 1 hour. [2 points]

□ Pain prevents me from standing for more than 30 minutes. [3 points]

□ Pain prevents me from standing for more than 10 minutes. [4 points]

□ Pain prevents me from standing at all. [5 points]

Section 7: Sleeping

□ Pain does not prevent me from sleeping well. [0 points]

□ I can sleep well only by using tablets. [1 point]

□ Even when I take tablets I have less than 6 hours sleep. [2 points]

□ Even when I take tablets I have less than 4 hours sleep. [3 points]

□ Even when I take tablets I have less than 2 hours of sleep. [4 points]

□ Pain prevents me from sleeping at all. [5 points]

Section 8: Sex Life

□ My sex life is normal and causes no extra pain. [0 points]

□ My sex life is normal but causes some extra pain. [1 point]

□ My sex life is nearly normal but is very painful. [2 points]

□ My sex life is severely restricted by pain. [3 points]

□ My sex life is nearly absent because of pain. [4 points]

□ Pain prevents any sex life at all. [5 points]

Section 9: Social Life

□ My social life is normal and gives me no extra pain. [0 points]

□ My social life is normal but increases the degree of pain. [1 point]

□ Pain has no significant effect on my social life apart from limiting energetic interests such as dancing. [2 points]

□ Pain has restricted my social life and I do not go out as often. [3 points]

□ Pain has restricted my social life to my home. [4 points]

□ I have no social life because of pain. [5 points]

Section 10: Traveling

□ I can travel anywhere without extra pain. [0 points]

□ I can travel anywhere but it gives me extra pain. [1 point]

□ Pain is bad but I manage journeys over 2 hours. [2 points]

□ Pain restricts me to journeys of less than 1 hour. [3 points]

□ Pain restricts me to short necessary journeys under 30 minutes. [4 points]

□ Pain prevents me from traveling except to the doctor or hospital. [5 points]

Interpretation:

Simply add up your points for each section and plug it in to the following formula in order to calculate your level of disability: point total / 50 X 100 = % disability (aka: 'point total' divided by '50' multiply by ' 100 = percent disability)

Example: on my last ODI I scored a 18. So, 18/50 x 100 = 36% disability:

ODI Scoring:

0% to 20% (minimal disability): Patients can cope with most activities of daily living. No treatment may be indicated except for suggestions on lifting, posture, physical fitness and diet. Patients with sedentary occupations (ex. secretaries) may experience more problems than others.

21%-40% (moderate disability): Patients may experience more pain and problems with sitting, lifting and standing. Travel and social life are more difficult. Patients may be off work. Personal care, sleeping and sexual activity may not be grossly affected. Conservative treatment may be sufficient.

41%-60% (severe disability): Pain is a primary problem for these patients, but they may also be experiencing significant problems in travel, personal care, social life, sexual activity and sleep. A detailed evaluation is appropriate.

61%-80% (crippled): Back pain has an impact on all aspects of daily living and work.

Active treatment is required.

81%-100%: These patients may be bed bound or exaggerating their symptoms. Careful evaluation is recommended.

APPENDIX – IV

GROUP – A

S. No	ODI		VAS	
	Pre Test	Post Test	Pre Test	Post Test
1	39	15	37	25
2	35	15	42	28
3	35	16	40	28
4	40	16	35	25
5	45	15	36	24
6	42	18	45	25
7	43	17	35	26
8	36	14	35	26
9	38	16	37	25
10	36	17	40	28
11	35	15	42	29
12	38	16	41	27
13	40	18	35	25
14	42	18	36	26
15	37	15	42	27

GROUP – B

S. No	ODI		VAS	
	Pre Test	Post Test	Pre Test	Post Test
1	8	3	8	4
2	6	2	9	4
3	9	4	7	3
4	5	1	10	4
5	7	2	8	3
6	8	2	9	4
7	6	1	8	4
8	7	3	9	4
9	8	4	10	3
10	9	3	7	3
11	8	2	10	3
12	7	3	8	3
13	7	2	7	3
14	9	3	9	4
15	8	3	10	4